A·R·S SCIENCE HALL OF FAME

JUNE 9, 1987

Agricultural Research Service

United States Department of Agriculture

The Agricultural Research Service Science Hall of Fame

The ARS Science Hall of Fame was inaugurated in 1986 with the selection of the agency's first Hall of Famer, Edward F. Knipling, a world-renowned entomologist. We determined that each succeeding year, one or more present or former scientists with the Agricultural Research Service could be selected, subject to the following criteria:

- The selectee's research must have contributed significantly to the solution of a major agricultural problem and reflect credit on the Agricultural Research Service.
- The selectee is recognized nationally and internationally by his or her peers in the scientific community.
- The selectee's character and record of achievement is worthy of emulation by younger agricultural scientists.
- The selectee must be either retired or eligible to retire and must continue to be professionally active.

Today we honor several outstanding scientists by inducting them into the Science Hall of Fame. A plaque citing the achievements of each will be on permanent display in the new ARS National Visitor Center, scheduled for formal opening in 1988 at the Beltsville Agricultural Research Center.

T. B. Kinney

T.B. Kinney, Jr.
Administrator

June 9, 1987

Edward F. Knipling
Director (retired)
Entomology Division
Beltsville, Maryland

For pioneering research and leadership in development of the sterile insect technique, which led to the eradication of the screwworm, and of other technologies to suppress and manage insect pests.

Edward F. Knipling developed the innovative sterile male technique of insect control. In the early 1950's, an era when insect control strategies depended almost entirely on chemical pesticides, he proposed that insect pests could be controlled by sterilizing the males to disrupt reproduction.

Implementation of the technique required many years of trial and error in learning how to rear insects in large quantities, maintain viable colonies, and make sure the released sterile insects performed as desired. The technique has been used effectively against Mediterranean fruit flies, gypsy moths, boll weevils, tsetse flies, and screwworms. Against the screwworm alone, the sterile male technique has saved about $8 billion in the cost of producing meat and dairy products.

As director of the Entomology Division, Dr. Knipling fostered development of ecologically acceptable biological controls, pest-resistant crop varieties, insect attractants and repellents, insect growth-inhibiting chemicals, and integrated systems of managing many of our worst insect pests.

Dr. Knipling has received many national and international awards for the sterile male research and other studies, including election to the National Academy of Sciences, and he received a nomination for the Nobel Prize in 1977.

Retired since 1973, after 43 years of service with the U.S. Department of Agriculture, Dr. Knipling continues to analyze the major insect pest problems and ways that new advances in research and technology may be put to use.

Howard L. Bachrach
Chief Scientist (retired)
Plum Island Animal Disease Center
Greenport, New York

For pioneering research on the molecular biology of foot-and-mouth disease that led to development of the world's first effective subunit vaccine for any disease of animals or humans through the use of gene splicing.

Howard L. Bachrach made his first significant contribution to the conquest of viral diseases in 1949 with his research on foot-and-mouth disease viruses. In the early 1950's, he conducted pioneering work on purification of polio virus. Polio and foot-and-mouth disease viruses are closely related and have many similar physical and chemical characteristics.

After he joined the Agricultural Research Service in 1953, he and his colleagues built the foundations for the eventual creation of a cloned protein vaccine for foot-and-mouth disease. This milestone was reached in 1981 in collaboration with Genentech scientists.

Dr. Bachrach has received many national and international honors, including election to the National Academy of Sciences, and he was awarded the National Medal of Science in 1983.

In retirement, he continues the fight against viral diseases, serving as an adviser and consultant on molecular biology and immunology to the ARS Plum Island Animal Disease Center and others in USDA, as well as to the Walter Reed Army Institute of Research, the Office of Technology Assessment of the U.S. Congress, the National Research Council, and the National Cancer Institute. And in his spare time, he plays golf, a pastime he has enjoyed since his days on his high school golf team.

Myron K. Brakke
Research Chemist (retired)
Wheat and Sorghum Research
Lincoln, Nebraska

For consistent, career-long valuable contributions to the science of virology, particularly plant virology.

Myron K. Brakke's invention of density-gradient centrifugation for separating components of plant and animal cells has had a great and lasting worldwide influence on molecular biology.

His research efforts have also resulted in purification and biophysical characterization of cereal viruses and their nucleic acids, development of rapid serological and electron microscopic identification techniques, and demonstration that viruses can and do mutate in the host plant.

In studies on vectors of soilborne cereal viruses, he identified *Polymyxa graminis*, an obligate fungal pathogen of the cereal root-cortex, as the vector of soilborne wheat mosaic virus.

His work has included research on the stability of plant viruses and their tendency to aggregate as their purity increases during isolation, investigation of factors involved in virus/host interactions, and systematic classification of plant viruses.

He was instrumental in the establishment of a virus antisera bank at the American Type Culture Collection.

Dr. Brakke is the recipient of many honors, including election to the National Academy of Sciences, and is the only person to be awarded the USDA Superior Service Award twice, in 1968 and 1986.

Dr. Brakke, who retired from the Agricultural Research Service in 1986 after 31 years of service, remains active as a member of several professional committees and as a consultant. And he and his wife reside on a farm where they maintain "several acres of wildlife and plant virus habitat."

Glenn W. Burton
Research Plant Geneticist
Forage and Turf Research
Tifton, Georgia

For outstanding achievements in forage and turf science, which have had extraordinary effects on the forage-based cattle industry, the turf industry, and agriculture worldwide.

Glenn W. Burton developed Coastal bermudagrass and solved problems associated with its establishment and management. Coastal bermudagrass has been planted on more than 10 million acres throughout the Southern United States.

The first commercial production of hybrid seed of pearl millet was a result of his four inbred line releases in 1962. Through his efforts, pearl millet became not only an important forage crop for the Southeast, but an unusually effective laboratory plant for studies of breeding methodology, cytogenetics, and increased grain potential. Pearl millet varieties and breeding techniques developed under his guidance have had remarkable success in India, Mexico, Bolivia, and Brazil.

Dr. Burton significantly expanded breeding procedures on bahiagrass, which are widely applicable to other cross-pollinated species.

His research on turf grass has worldwide application. The results include bermudagrasses suitable for fine turf, particularly Tiflawn, Tiffine, Tifgreen, Tifway, and Tifdwarf.

Dr. Burton has received many prestigious honors, including the National Medal of Science in 1983. Still a full-time employee of the Agricultural Research Service, where he has worked since 1936, he continues his studies in the genetics and breeding of forage and turf, maintains a busy lecture schedule, and publishes an average of one paper a month.

Wilson A. Reeves
Chief (retired)
Cotton Finishing Laboratory
New Orleans, Louisiana

For outstanding research and leadership in the field of textile chemical finishing that has significantly benefited agriculture and consumers.

Wilson A. Reeves developed individually and with other scientists many economically beneficial techniques for making cotton and cotton-blend fabrics flame resistant, flame retardant, wash-and-wear, and durable press.

Dr. Reeves and his coworkers developed a theoretical mechanism to explain wet and dry wrinkle recovery in wash-and-wear and durable-press cotton textiles. With this knowledge, he and other researchers were able to develop new processes and improve old ones for treating cotton and cotton blends for durable-press performance.

He and his colleagues were the first to demonstrate that light-and medium-weight cotton fabrics could be made flame resistant without loss in strength or softness. The process they developed was adopted by the textile industry in 1972 for production of flame-resistant children's sleepwear.

Other processes Dr. Reeves has helped develop include slack mercerization, which produces woven cotton fabrics with stretch and elastic recovery properties; one that produces durable-press cotton fabrics that can be creased by a home sewer or garment manufacturer when and where desired; and a chainless mercerizer for mercerizing cotton yarn and knit and woven fabrics with liquid ammonia to improve strength, elongation, abrasion resistance, and smooth drying properties of durable-press cottons.

Dr. Reeves' many honors include the 1966 Olney Medal for outstanding achievement in textile chemistry, the highest award given by the American Association of Textile Chemists and Colorists.

After retiring from ARS with 33 years service in 1975, Dr. Reeves immediately took up a teaching and consulting career that he continues to pursue.

Ernest R. Sears
Research Geneticist (retired)
Cereal Genetics Research
Columbia, Missouri

For pioneering work in wheat genetics and for discoveries on chromosomal mechanisms that established standards in animal, plant, and human genetics.

Ernest R. Sears conducted research that provided essential data about the 21 chromosomes of wheat. He also pioneered biotechnological methods for studying wheat genetics. These data and methods have helped increase the efficiency of wheat genetics research. They provide the knowledge, tools, and concepts for all the current chromosome engineering in wheat improvement. The methods have also been adapted to other animal and plant systems, including human clinical cytogenetics.

Dr. Sears, in collaboration with other scientists, (1) discovered the ancestral origins of common wheat, knowledge that led to a better understanding of how wheat and other polyploid species arise, how they persist, and how they can be improved by breeding and (2) demonstrated the genetic control of meiosis, which resulted in a new perspective on evolution through polyploidy and has made possible certain techniques for transferring desirable genes from alien chromosomes.

Among the other results of his studies on the genetics of wheat are several sources of worldwide disease resistance, development of chromosome substitution lines for use in analyzing wheat genetics (a technique applicable to many crop species), and development of materials that allow transfer of genes from rye, barley, and wild grasses to wheat, which provides new genetic sources for pest-resistance, tolerance, and vigor in wheat.

Dr. Sears was a co-recipient of the Wolf Prize for Agriculture in 1986, the most recent of his many honors.

Though retired from the Agricultural Research Service after 44 years of service, Dr. Sears is continuing in his 51st year of research in chromosome engineering for development and transfer of genes from wild relatives into wheat.

Orville A. Vogel
Research Agronomist (retired)
Wheat Breeding and Production
Pullman, Washington

For development of the first useful semidwarf wheats and of innovative production systems that made the Pacific Northwest a major source of soft white wheat, inspired similar research efforts throughout the world, and sparked the Green Revolution.

Orville A. Vogel was the first to develop a commercial semidwarf cultivar of a cereal grain in North America. He developed Gaines wheat, which established the high yield potential for soft white wheats worldwide. Wheats and cultivars developed from germplasm collected and assembled by Dr. Vogel contribute 20 to 30 percent more wheat to the annual production in the three Northwest States.

He willingly shared his wheat germplasm with N.E. Borlaug, leader of the International Maize and Wheat Improvement Center program in Mexico that launched the Green Revolution. When Dr. Borlaug received the Nobel Peace Prize for his work, he publicly credited Dr. Vogel's contribution for the success of the program.

Dr. Vogel is also the inventor of highly regarded equipment for use on farm plots, especially those used for scientific experiments. His Vogel Thresher is used in virtually every wheat research program worldwide.

He received the National Medal of Science in 1976 and has been recognized with many other national and international awards. Though he retired in 1972 after 42 years with the Agricultural Research Service, Dr. Vogel continues his involvement in wheat research as a consultant, as an inspiration and adviser to younger scientists, and as a highly effective fundraiser. In 1980, he started a wheat research fund as a challenge to citizens of the Pacific Northwest. With Dr. Vogel and his wife initially matching $1 for every $20 received from private individuals, the fund now stands at more than half a million dollars. Two of the three projects currently underwritten by the fund are led by ARS scientists.

Cecil H. Wadleigh
Director (retired)
Soil and Water Conservation Research Division
Beltsville, Maryland

For elucidating the mechanisms through which crops respond to salinity and water stress and for inspired planning and leadership that enabled and motivated those who worked with him to expand and make use of knowledge of soils, water, and air and their interactions with plants.

Cecil H. Wadleigh led the research that determined the effects of salinity on plant growth, findings that provided a substantial part of the information published in USDA's Agriculture Handbook 60, "Diagnosis and Improvement of Saline Soil," the definitive work on this subject since its publication more than 25 years ago.

He discovered several basic mechanisms that enable plants to adapt to such specific environmental stresses as drought and salinity.

He documented how and why plant growth responds to water stress and co-authored the 180-page chapter on "Soil Water and Plant Growth" in the American Society of Agronomy Monograph "Soil Physical Conditions and Plant Growth," which was recognized as the authoritative treatise on this subject for 20 years.

During his 30 years with the Agricultural Research Service from which he retired in 1971, he was a highly effective planner and administrator. As director of the Soil and Water Conservation Research Division from 1955 to 1971, he organized a program and facilities expansion that more than doubled the scientific efforts of the Division.

Dr. Wadleigh has been honored many times for his achievements. In 1976, the Soil Conservation Society of America presented him with its Hugh Hammond Bennett Award for his "Significant Contributions to Conservation of Our Nation's Resources."

In recent years, Dr. Wadleigh has applied his considerable knowledge of plants and soils to the development of his home gardens, which are locally renowned.